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REFERENCES

BLEEKER, (1846): *Nat. Geneesk. Arc. Ned. Indie.* 3(2): 135.
HORA, S.L. (1940): On a collection of fish from the headwaters of the Mahanadi River, Raipur District.

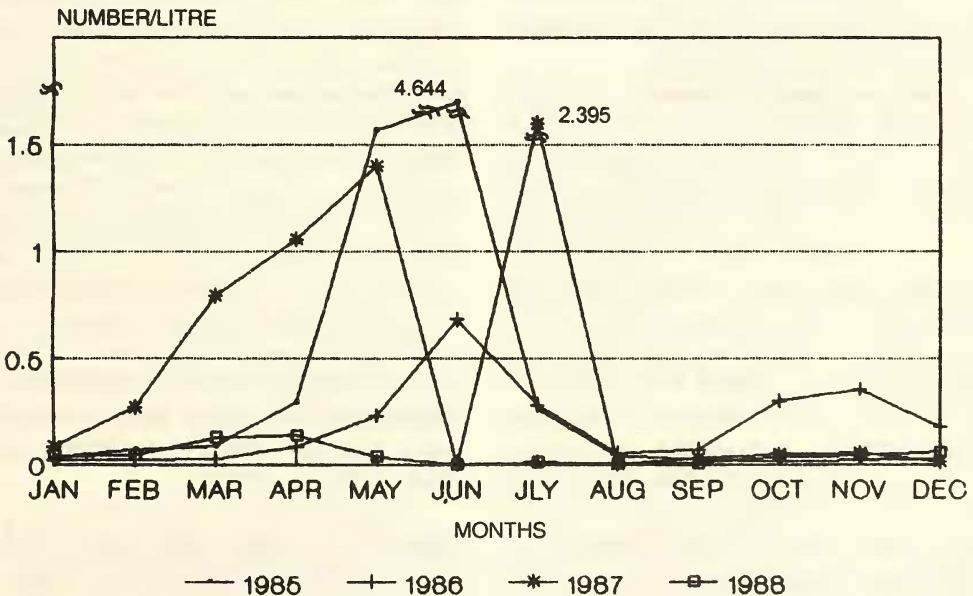
C.P. *Rec. Indian Mus.* 42(2): 365-374.
TALWAR, P.K. & A.G. JHINGRAN (1991): *Inland fishes of India and adjacent countries.* Oxford & IBH Publishing Co., New Delhi.

23. SEASONAL ABUNDANCE AND CHECKLIST OF AQUATIC BUGS AND BEETLES OF KEOLADEO NATIONAL PARK, BHARATPUR, INDIA

(With two text-figures)

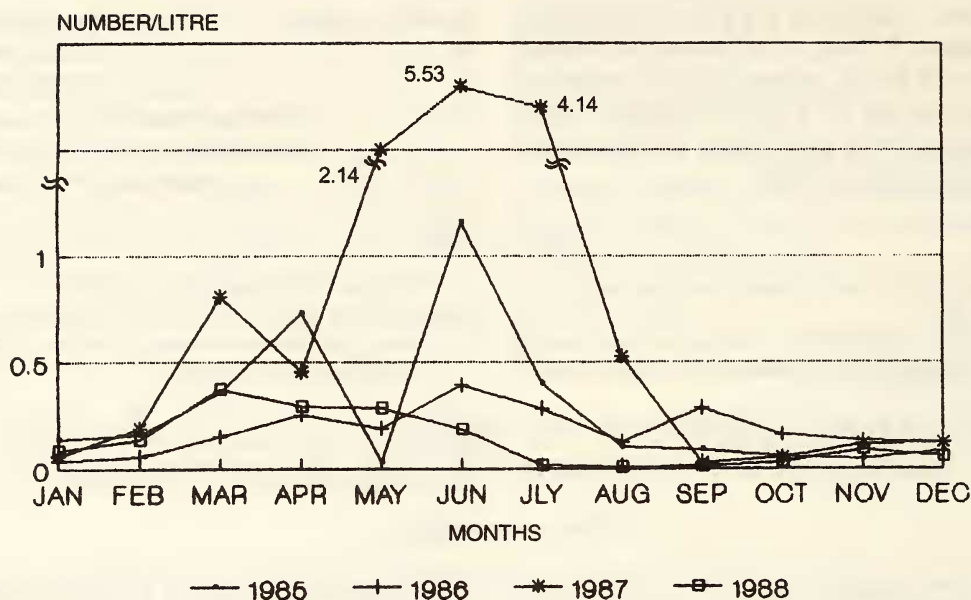
The Keoladeo National Park, Bharatpur is known for the large congregation of waterfowl and other aquatic birds which feed mainly on aquatic insects and fishes (Ali and Vijayan, 1983). Even though some preliminary studies were carried out

on the aquatic insect fauna of the Park (Mahajan *et al.*, 1982), a complete and authentic checklist is not available. Most of the insects were identified up to family level. (Ali and Vijayan 1986, and Vijayan 1991). The present report covers the



ABUNDANCE OF BEETLES: 1985-1988

Fig. 1: Average number of beetles collected from Keoladeo National Park



ABUNDANCE OF BUGS: 1985-1988

Fig. 2: Average number of bugs collected from Keoladeo National Park

seasonal abundance and list of aquatic bugs and beetles from Keoladeo National Park, Bharatpur, (KNP) collected during 1985-1988.

Study area and Methodology: Keoladeo National Park, Bharatpur ($27^{\circ} 7.6'$ to $27^{\circ} 12.2'$ N and $77^{\circ} 29.5'$ to $77^{\circ} 33.9'$ E) is situated 50 km west of Agra and 180 km south of New Delhi. The total area of the park is 29 sq. km, of which 8.5 sq. km is wetland. The water depth in the aquatic area varies from 0-200 cm. The water inside the park is drawn during monsoon every year through a canal from Ajan bund, an inundation reservoir situated half a kilometre south of KNP. The Park dries up in May-June, leaving some pools in the deeper area. Insects were collected fortnightly between 0600 hrs and 1000 hrs from 23 stations, using an insect sampler as described by Ali and Vijayan (1983).

Seasonal Abundance: The total number of insects collected per litre of water were recorded. The average number of insects collected during each month is summarised in

Figs. 1 and 2. The general trend in population fluctuation of beetles and bugs showed almost the same pattern. They were more numerous during the summer when the water availability in KNP was less. Their numbers were minimum during the winter and the monsoon, when the availability of water was more. However, the species composition showed wide fluctuations during different seasons within a year and between the years. A significant negative correlation was noticed with water depth ($r = -0.713$, $p < 0.001$). The availability of insects in the park showed a significant negative relation with water depth and dissolved oxygen. Both CO_2 and Methyl orange alkalinity showed a significant positive relation (Vijayan, 1991).

During summer, the aquatic area of the park dries up, leaving small puddles. The peak in the availability of insects during summer was mainly due to their aggregation in these puddles. Smaller species like *Canthydrus laetabilis* and *Plea* sp. survived in the puddles in large numbers.

MISCELLANEOUS NOTES

TABLE I
BUGS AND BEETLES RECORDED IN THE PARK

Bugs	Abundance
Order: Hemiptera	
Family: Belostomatidae	
<i>Lithocerus indicus</i>	**
<i>Sphaerodema molestum</i> (Dufour)	*
<i>Sphaerodema annulatum</i> Fabricius	*
<i>Sphaerodema rusticum</i> Fabricius	*
Family: Corixidae	
<i>Micronecta scutellaris</i> (Stal)	*
<i>Corixa hieroglyphica</i> Dufour	*
Family: Notonectidae	
<i>Anisops cavifrons</i> Brooks.	*
Family: Nepidae	
<i>Nepa cinerea</i>	***
<i>Ranatra sordidula</i> Dohrn	**
Family: Gerridae	
<i>Gerris spinolae</i>	*
Family: Pleidae	
<i>Plea</i> sp.	*
Beetles	
Order: Coleoptera	Abundance
Family: Dytiscidae	
<i>Hyphoporus elevatus</i> Sharp	**
<i>Cybister limbatus</i> Fab	***
<i>Laccophilus parvulus</i> Aube	**
<i>Eretes sticticus</i> L.	**
<i>Canthydrus laetabilis</i> Walke	*
Family: Hydrophilidae	
<i>Amphiops simplex</i> Sharp.	**
<i>Amphiops</i> sp. nr. <i>mater</i> Sharp	**
<i>Berosus indicus</i> Motschulsky	**
Family: Gyrimidae	
<i>Dineutus unidentatus</i> Aube	**

(Note: * = Common, ** = Not common and *** = Rare)

Larger species left the puddles for crevices in the mud, and also beneath the dry thick vegetation in the aquatic area.

One of the factors determining the abundance of insects was recruitment from outside the Park (Ajan bund) during monsoon. *Gerris spinolae*, *Anisops cavifrons*, *Cybister limbatus* larvae were collected along with the water from Ajan bund. Another factor determining insects in the Park appears to be related to the fluctuations in the biomass of aquatic macrophytes. The peak in the availability of aquatic insects seemed to be associated with the aquatic plants (Vijayan, 1991). Similar association was also reported by Tonapi and Ozarkar (1969) and Roy (1982).

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REFERENCES

- ALI, S. & V.S. VIJAYAN (1983): Hydrological (Ecological) Research Keoladeo National Park, Bharatpur, First Interim report, Bombay Natural History Society, Bombay.
- ALI, S. & V.S. VIJAYAN (1986): Keoladeo National Park Ecological study summary Report 1980-1985. Bombay Natural History Society, Bombay.
- MAHAJAN, C.L., SHARMA & N.K. ARORA (1982) Benthic fauna in a Wetland Ecosystem (Ghana Bird Sanctuary, Bharatpur) subjected to drought areas. *In: Wetlands Ecology and Management (Part II)*. International Scientific Publications and National

Institute of Ecology. pp 145-148.
 ROY, S.P. (1982): Seasonal variations and species diversity of aquatic Coleoptera in a freshwater pond at Bhagalpur, India. *Oriental Ins.* 16(1): 55-62.
 TONAPI, G.T. & V.A. OZARKAR (1969): A study on the

aquatic Coleoptera of Poona (Maharashtra). *J. Bombay nat. Hist. Soc.* 66(3): 533-538.
 VIJAYAN, V.S. (1991): Keoladeo National Park Ecology Study, Final Report, 1980-1990. Bombay Natural History Society, Bombay.

24. CONGREGATION OF COMMON CROW *EUPLOEA CORE* BUTTERFLIES AT BANNERGHATTA NATIONAL PARK

Some adult danaiids like *Danaus limniace*, *D. chrysippus*, and *Euploea core* have been observed to feed on *Heliotropium indicum* (Amladi, 1975) and *Crotalaria retusa* (Chaturvedi & Satheesan, 1979) to acquire pyrrolizidine alkaloids contained in them. *Trichodesma* (Chaturvedi, 1994) and *Paracaryum coelestinum* (Haribal, 1992) were subsequently added to this list.

In Bannerghatta National Park, 25 km from Bangalore city, *Lantana camara* and *Chromolaena odorata* grow profusely in many parts of the park. These plants were cleared along the main road leading into the park, both by cutting down branches and by uprooting them and leaving them along the roadside.

I visited the National Park twice, on August 23 and August 30, 1998, and on both occasions it had rained the previous evening and through the night.

On both days many Common Crow *Euploea core* butterflies were noticed congregating only on dry roots of *Chromolaena odorata* and not on those of *Lantana*. However, none of the other Danaids were seen doing so, though the Striped Tiger *Danaus genutia* and the Dark Blue Tiger *D. melissa* were seen in the area (except possibly for the Double-banded Crow *Euploea coreta*, a forewing of which was found in the vicinity).

In the past, I have noticed many danaiids visiting *Heliotropium* spp. and *Crotalaria*. It is for the first time that I have seen a congregation of Common Crow on the exposed roots of *Chromolaena odorata*.

Is it possible that *Euploea core* acquire some alkaloids from the roots of *Chromolaena odorata* like they do by visiting *Heliotropium indicum* and other plants?

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Editor's note: The author's assumption is correct. Males of many danaine butterflies including members of *Euploea* are strongly attracted to withered or damaged plants of Asteraceae, to which they apply fluid by means of their proboscids and imbibe it with dissolved pyrrolizidine (PAs). These PAs in danaine butterflies serve a dual function: as male pheromone precursors and as protective chemicals. It has also been reported that females are also attracted to PA plants and PAs have been observed in females of several danaines. It may be useful to census the sex of adults of *Euploea core* aggregating in *Chromolaena odorata* to find out if females are also attracted to the damaged plants, for females are supposed to gather PAs from nectar of flowers of Asteraceae and Boraginaceae.

REFERENCES

- AMLADI, S.R. (1975): Danaid Butterflies attracted to *Heliotropium indicum* (Boraginaceae), an alkaloid containing plant. *J. Bombay nat. Hist. Soc.* 72(2): 585-587.
 CHATURVEDI, N. & S.M. SATHEESAN (1979): Attraction of Butterflies to *Crotalaria retusa* (Papilionaceae) at Khandala, W. Ghats. *J. Bombay nat. Hist. Soc.* 76: 534-535.
 HARIBAL, MEENA (1992): The Butterflies of Sikkim Himalaya and their Natural History. Sikkim Nature Conservation Foundation (SNCF), Gangtok, Sikkim.